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Two new species of *Ceriporia* (*Basidiomycota, Polyporales*) with a key to the accepted species in China

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Abstract — Two new polypores, *Ceriporia inflata* and *C. jiangxiensis* spp. nov. are described from China: *C. inflata* is characterized by large pores (2–3 per mm), cylindrical to oblong-ellipsoid basidiospores (4.7–5.2 × 2–2.4 µm), and hyphae that swell in KOH; *C. jiangxiensis* has ellipsoid, cylindrical to oblong-ellipsoid basidiospores (4.8–5.8 × 2.1–2.7 µm), mycelioid cystidia, and distinctly thick-walled subicular hyphae. A key to accepted species of *Ceriporia* in China is provided.

Key words — wood-inhabiting fungi, *Phanerochaetaceae,* taxonomy

Introduction

The principal characteristics of *Ceriporia* Donk, described by Donk (1933), are resupinate basidiocarps, an annual growth habit, a monomitic hyphal system with simple septate generative hyphae, and thin-walled, smooth, and cylindrical, oblong-ellipsoid or allantoid basidiospores (Núñez & Ryvarden 2001; Pieri & Rivoire 1997). Of the 32 *Ceriporia* species accepted worldwide (Aime et al. 2007; Bernicchia & Niemelä 1998; Buchanan & Ryvarden 1988; Dai et al. 2002; Gilbertson & Hemmes 2004; Jia & Cui 2011; Læssøe & Ryvarden 2010; Lindblad & Ryvarden 1999; Mata & Ryvarden 2010; Pieri & Rivoire 1997; Rajchenberg 2000; Ryvarden & Iturriaga 2003; Suhara et al. 2003), 16 have been recorded in China (Cui & Jia 2011; Cui et al. 2008; Dai 2012; Dai et al. 2002, 2003, 2004, 2007a,b, 2009, 2011; Dai & Penttilä 2006; Jia & Cui 2011; Li et al. 2007, 2008; Wang et al. 2009, 2011; Yuan & Dai 2008; Yuan et al. 2006).

During a taxonomic study on *Ceriporia* in China, two species new to science were found that are described and illustrated here. An identification key to *Ceriporia* species in China based on Chinese material is provided.

Materials & methods

The studied specimens were deposited in herbaria as cited below. The microscopic procedure follows Dai (2010). Sections were studied at magnification up to ×1000 using

a Nikon Eclipse 80i microscope and phase contrast illumination. Drawings were made with the aid of a drawing tube. To present spore size variation, the 5% of measurements excluded from each end of the range are given in parentheses. Length of the basidiospore spines is not included in the measurements. Abbreviations include IKI = Melzer's reagent, IKI– = negative in Melzer's reagent, KOH = 10% potassium hydroxide, CB = Cotton Blue, CB+ = cyanophilous, CB– = acyanophilous, L = mean spore length (arithmetic average of all spores), W = mean spore width (arithmetic average of all spores), Q = variation in the L/W ratios between the specimens studied, and n = number of spores measured from a given number of specimens. Special color terms follow Petersen (1996).

Taxonomy

Ceriporia inflata B.S. Jia & B.K. Cui, **sp. nov.** Fig. 1

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Differs from other *Ceriporia* species by its large pores and hyphae that become swollen in KOH.

Type: China, Hainan Province, Qiongzhong County, Limushan Forest Park, on rotten angiosperm wood, 24.V.2008, Dai 9587 (**holotype**, BJFC).

Etymology: *inflata* (Lat.): referring to hyphae becoming swollen in KOH.

Fruitbody — Basidiocarps annual, resupinate, corky to brittle when dry, up to 13 cm long, 7 cm wide, and 3 mm thick at center. Pore surface white to cream when fresh, become buff, cinnamon-buff to clay-buff when dry; pores angular to irregular, 2–3 per mm; dissepiment thin, lacerate. Margin distinct, cream, thinning out, up to 0.8 mm, sometimes pores extend to the very edge, flocculent. Subiculum cream, corky when dry, up to 1 mm thick. Tubes concolorous with pore surface, brittle when dry, up to 2 mm thick.

Hyphal structure — Hyphal system monomitic; generative hyphae with simple septa, IKI–, CB+, swollen in KOH.

Context — Generative hyphae hyaline, thick-walled with a wide lumen, frequently branched at right angle, with frequent simple septa, more or less constricted at septa, interwoven, usually covered by small pale yellowish crystals, 4–8 μm in diam.

Tubes — Tramal hyphae hyaline, thin- to slightly thick-walled, frequently branched, with frequent simple septa, sometimes constricted at septa, subparallel along the tubes, covered by abundant tiny hyaline to pale yellowish crystals, 3.8–5 μm in diam; cystidia and cystidioles absent; basidia clavate, with four sterigmata and a basal simple septum, 12.9–19 × 3.8–4.2 μm; basidioles in shape similar to basidia, but smaller.

Spores — Basidiospores allantoid to cylindrical, hyaline, thin-walled, smooth, some slightly curved, IKI–, CB–, (4.5–)4.7–5.2(–5.3) × 2–2.4(–2.5) μm, L = 4.93 μm, W = 2.15 μm, Q = 2.29 (n = 30/1).

Type of rot — White rot.

Additional specimen examined — **China**, **Jiangxi Province**, Fenyi County, Dagang Mountain, on fallen trunk of *Alnus*, 17.IX.2008 Dai 10376 (BJFC).

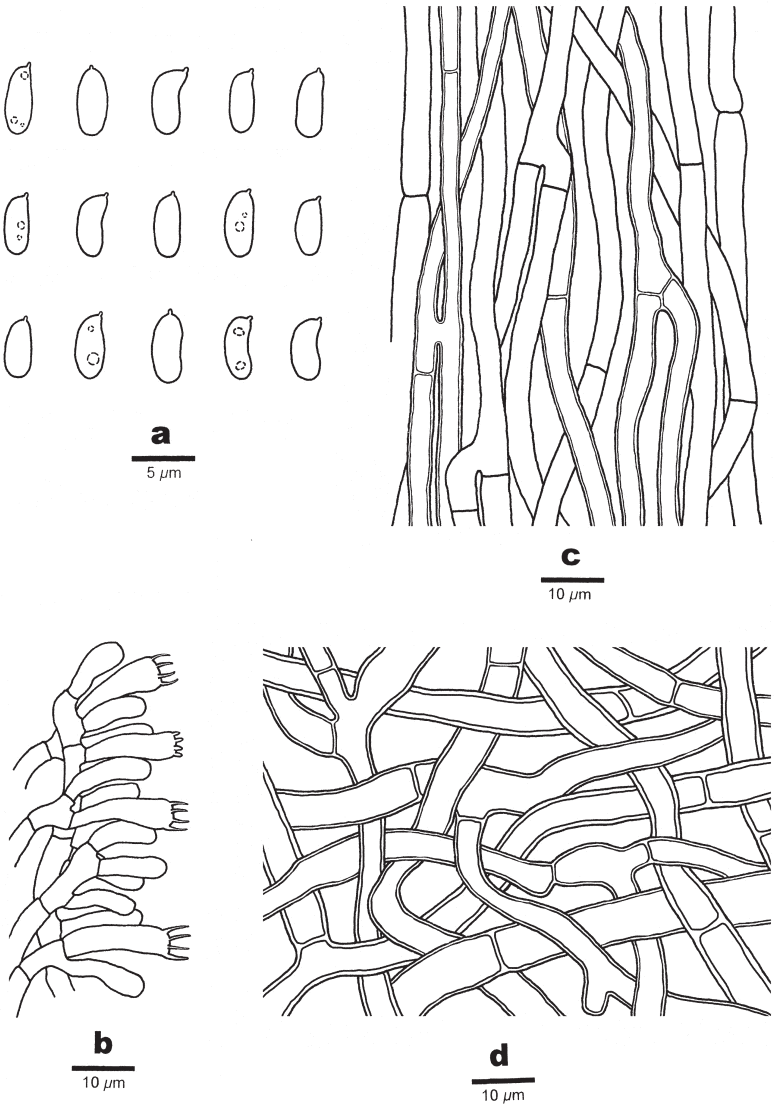

Fig. 1. *Ceriporia inflata* (holotype), microscopic structures.
a: Basidiospores. b: A section of hymenium. c: Hyphae from trama. d: Hyphae from subiculum.

Remarks — *Ceriporia albobrunnea* Ryvarden & Iturr., recently described from Venezuela by Ryvarden & Iturriaga (2003), resembles *C. inflata* in similar pores (2–3 per mm, from the type) and basidiospores [4–5.1(–5.4) × (1.7–)1.9–2.2

(–2.4) μm, L = 4.6 μm, W = 2.05 μm, Q = 2.24 (n = 30/1, from the type)], but in *C. albobrunnea* tramal and subicular hyphae are very similar, while in *C. inflata* subicular hyphae are distinctly thick-walled and tramal hyphae are thin-walled. In addition, hyphae do not become swollen in KOH and dissepiments are thick and entire in *C. albobrunnea*, contrasting with hyphae that swell in KOH and thin lacerate dissepiments in *C. inflata*.

Ceriporia davidii (D.A. Reid) M. Pieri & B. Rivoire from France (Pieri & Rivoire 1997), has a similar hyphal but is differentiated from *C. inflata* by wider basidiospores [(4.2–)4.6–6(–6.5) × (2–)2.2–2.9(–3) μm, L = 5.08 μm, W = 2.58 μm, Q = 1.97 (n = 30/1, measured from the type)] that taper towards the apiculus and hyphae that do not swell in KOH.

Ceriporia jiangxiensis B.S. Jia & B.K. Cui, **sp. nov.** Fig. 2

MycoBank MB 800810

Differs from other *Ceriporia* species by its variably shaped basidiospores, presence of cystidia, distinctly thick-walled subicular hyphae, and occasional clamp connections.

Type: China, Jiangxi Province, Fenyi County, Dagang Mountain, on fallen angiosperm trunk, 21.IX.2009, Cui 7712 (**holotype**, BJFC).

Etymology: *jiangxiensis* (Lat.): referring to the local province name of Jiangxi.

Fruitbody — Basidiocarps annual, resupinate, brittle when dry, up to 8 cm long, 6 cm wide, and 2 mm thick. Pore surface cream, buff, cinnamon-buff when dry; pores angular to irregular, 3–4 per mm; dissepiment thin, entire to lacerate. Margin distinct, cream, cottony, up to 1.6 mm wide. Subiculum cream, corky when dry, up to 0.5 mm thick. Tubes concolorous with pore surface, brittle when dry, up to 1.5 mm thick.

Hyphal structure — Hyphal system monomitic; generative hyphae mostly with simple septa but rarely bearing clamp connections, IKI–, CB+, tissues unchanged in KOH.

Context — Generative hyphae hyaline, distinctly thick-walled with a wide lumen, frequently branched at right angle, interwoven, usually covered by fine hyaline to pale yellowish crystals, 3.5–10 μm in diam.

Tubes — Tramal hyphae hyaline, thin- to slightly thick-walled, frequently branched, interwoven, covered by abundant hyaline to pale yellowish crystals, 2.5–4.5 μm in diam; cystidia present, mycelioid, hyaline, thin-walled, 46–61.5 × 4–6 μm; basidia clavate, with four sterigmata and a basal simple septum, 11–22.2 × 3.6–5 μm; basidioles in shape similar to basidia, but slightly smaller.

Spores — Basidiospores variable in shape, allantoid, ellipsoid, cylindrical to oblong-ellipsoid, hyaline, thin-walled, smooth, IKI–, CB–, sometimes bearing one or two small guttules, (4.7–)4.8–5.8(–5.9) × (2–)2.1–2.7(–2.8) μm, L = 5.24 μm, W = 2.35 μm, Q = 2.23 (n = 30/1).

Type of rot — White rot.

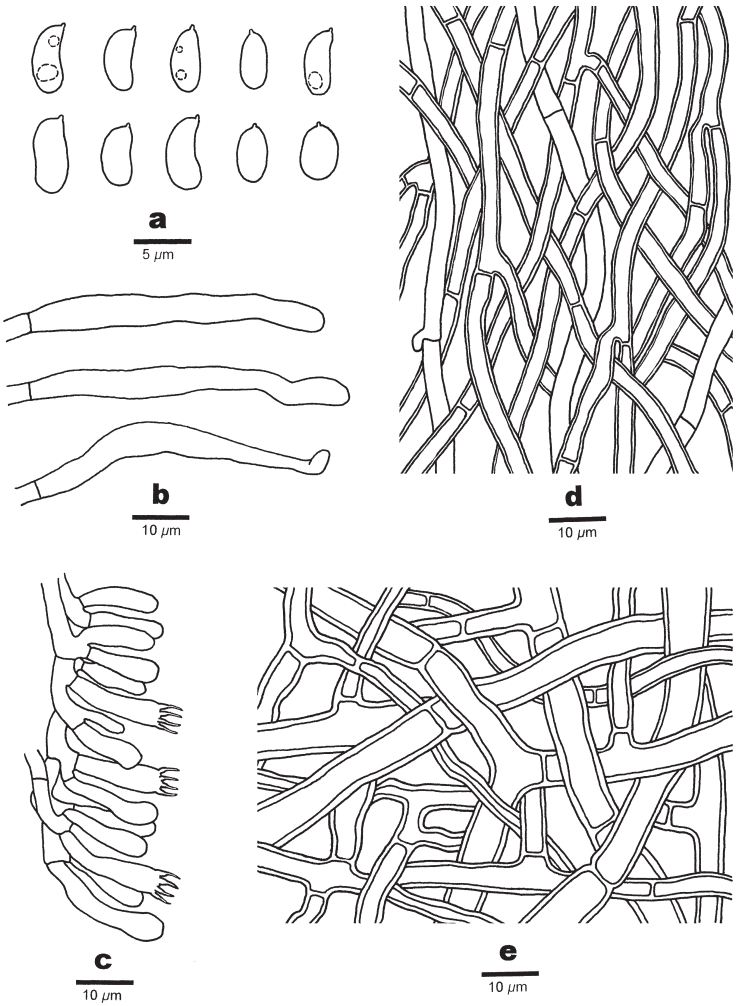

Fig. 1. *Ceriporia inflata* (holotype), microscopic structures.
a: Basidiospores. b: Cystidia. c: A section of hymenium.
d: Hyphae from trama. e: Hyphae from subiculum.

Remarks — Macroscopically, *Ceriporia jiangxiensis* is similar to *C. lacerata* N. Maek. et al., which differs in having broadly ellipsoid spores [4.25–5 × 2.5–2.75 μm (av. 4.5 ± 0.3 × 2.6 ± 0.1 μm, n = 20)] and lacking cystidia (Suhara et al. 2003).

Ceriporia camaresiana (Bourdot & Galzin) Bondartsev & Singer has similar basidiospores (5.5–6 × 2.3–2.8 µm) but is distinguished from *C. jiangxiensis* by larger pores (1–3 per mm), thin-walled subicular hyphae, and an absence of cystidia (Pieri & Rivoire 1997).

Ceriporia alba M. Pieri & B. Rivoire from France (Pieri & Rivoire 1997) shares similar pores (3–4 per mm) and cream-colored pore surface with *C. jiangxiensis,* but its holotype has longer basidiospores [(5.1–)5.2–6.3 × 2–2.8 µm, L = 5.84 µm, W = 2.35µm, Q = 2.49 (n = 30/1)], thin- to slightly thick-walled subicular hyphae, and no cystidia.

Other specimens examined: ***Ceriporia alba***. **FRANCE**, **Vernai**, In arboretis, Forêt de la Joux, Jura, Gallia. Ad lignum angiospermarum, 26.V.1995, Rivoire 1078 (TYPE, LY).

C. albobrunnea. **VENEZUELA**, **Estado Bolivar**, Sifontes, Tumerermo, Carretera Tumerermo Bochinche Camp. Maderero de Lut., on hardwood. 17.XI.1994, Ryvarden 35238 (TYPE, O).

C. davidii. **FRANCE**, **Orlienas**. 3.I.2007, Rivoire 3052 (TYPE, LY).

Key to species of *Ceriporia* in China

1. Hyphal system dimitic ..... ***C. totara*** (G. Cunn.) P.K. Buchanan & Ryvarden
1. Hyphal system monomitic 2

2. Hyphae swollen in KOH ..... ***C. inflata***
2. Hyphae unchanged in KOH 3

3. Cystidia present 4
3. Cystidia absent 7

4. Pores 1–2 per mm ..... ***C. mellea*** (Berk. & Broome) Ryvarden
4. Pores 3–5 per mm 5

5. Spores >2 µm wide ..... ***C. jiangxiensis***
5. Spores <2 µm wide 6

6. Pores pinkish buff when dry; spores oblong-ellipsoid, <5 µm long ..... ***C. nanlingensis*** B.K. Cui & B.S. Jia
6. Pores dark brown when dry; spores allantoid, >5 µm long. .... ***C. purpurea*** (Fr.) Donk

7. Spores >8 µm long. ..... ***C. reticulata*** (Hoffm.) Domański
7. Spores <8 µm long. 8

8. Spores >2.5 µm wide 9
8. Spores <2.5 µm wide 10

9. Spores ellipsoid to broadly ellipsoid, tramal hyphae parallel ..... ***C. lacerata***
9. Spores cylindrical to allantoid, tramal hyphae interwoven ..... ***C. camaresiana***

10. Spores allantoid 11
10. Spores ellipsoid to cylindrical, or cylindrical but a little curved 13

11. Spores narrowly allantoid, not tapering ..... ***C. spissa*** (Schwein.) Rajchenb.
11. Spores allantoid, tapering towards apiculus 12

12. Pores cream, cinnamon, orange, green, 3–6 per mm; spores mostly >4 µm long . . . . . ***C. viridans*** (Berk. & Broome) Donk
12. Pores salmon, clay-pink to brownish vinaceous, 5–8 per mm; spores mostly <4 µm long . . ***C. aurantiocarnescens*** (Henn.) M. Pieri & B. Rivoire

13. Spores cylindrical, a little curved, mostly >4 µm long 14
13. Spores ellipsoid to cylindrical, not curved, mostly <4 µm long 15

14. Pores rose-pink when fresh; tramal hyphae fairly thick-walled, frequently branched . . . . . ***C. tarda*** (Berk.) Ginns
14. Pores cream when fresh; tramal hyphae thin-walled, rarely branched . . . . ***C. davidii***

15. Pores sulphur; spores ellipsoid . . . . . ***C. sulphuricolor*** Bernicchia & Niemelä
15. Pores cream, orange or purple; spores cylindrical to oblong-ellipsoid 16

16. Pores orange or purple when fresh, 2–3 per mm; subicular hyphae mostly >6 µm in diam . . . . . ***C. excelsa*** (S. Lundell) Parmasto
16. Pores cream when fresh, 3–6 per mm; subicular hyphae <6 µm in diam 17

17. Pores 3–4 per mm; tramal hyphae distinctly thick-walled, interwoven . . . . . ***C. crassitunicata*** Y.C. Dai & Sheng H. Wu
17. Pores 4–6 per mm; tramal hyphae thin- to fairly thick-walled, parallel . . . . . ***C. alachuana*** (Murrill) Hallenb.

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Literature cited

Aime C, Ryvarden L, Henkel TW. 2007. Studies in neotropical polypores 22. Additional new and rare species from Guyana. Synopsis Fungorum 23: 15-31.

Bernicchia A, Niemelä T. 1998. *Ceriporia sulphuricolor*, a new polypore species from Italy. Folia Cryptogamica Estonica 33: 15-17.

Buchanan PK, Ryvarden L. 1988. Type studies in the *Polyporaceae* – 18. Species described by G.H. Cunningham. Mycotaxon 31: 1-38.

Cui BK, Jia BS. 2011. Wood-rotting fungi in eastern China 7. Polypores from Huangshan Mountain, Anhui Province. Mycosystema 30: 529-535.

Cui BK, Yuan HS, Dai YC. 2008. Wood-rotting fungi in eastern China 1. Polypores from Wuyi Mountains, Fujian Province. Sydowia 60: 25-40.

Dai YC. 2010. *Hymenochaetaceae* (*Basidiomycota*) in China. Fungal Diversity 45: 31-343. http://dx.doi.org/10.1007/s13225-010-0066-9

Dai YC. 2012. Polypore diversity in China with an annotated checklist of Chinese polypores. Mycoscience 53: 49-80. http://dx.doi.org/10.1007/s10267-011-0134-3

Dai YC, Penttilä R. 2006. Polypore diversity of Fenglin Nature Reserve, northeastern China. Annales Botanici Fennici 43: 81-96.

Dai YC, Wu SH, Chou WN. 2002. Two new polypores (*Basidiomycota*) from Taiwan. Mycotaxon 83: 209-216.

Dai YC, Härkonen M, Niemelä T. 2003. Wood-inhabiting fungi in southern China 1. Polypores from Hunan Province. Annales Botanici Fennici 40: 381-393.
Dai YC, Wei YL, Wang Z. 2004. Wood-inhabiting fungi in southern China 2. Polypores from Sichuan Province. Annales Botanici Fennici 41: 319-329.
Dai YC, Cui BK, Huang MY. 2007a. Polypores from eastern Inner Mongolia, northeastern China. Nova Hedwigia 84: 513-520. http://dx.doi.org/10.1127/0029-5035/2007/0084-0513
Dai YC, Cui BK, Yuan HS. 2007b. Notes on polypores from Gansu and Qinghai Province, northwest China. Cryptogamie Mycologie 28: 177-187.
Dai YC, Yuan HS, Wang HC, Yang F, Wei YL. 2009. Polypores (*Basidiomycota*) from Qin Mts. in Shaanxi Province, central China. Annales Botanici Fennici 46: 54-61.
Dai YC, Cui BK, Yuan HS, He SH, Wei YL, Qin WM, Zhou LW, Li HJ. 2011. Wood-inhabiting fungi in southern China. 4. Polypores from Hainan Province, Annales Botanici Fennici 48: 219-231.
Donk MA. 1933. Revisie van de Nederlandse *Heterobasidiomyceteae* (uitgez. *Uredinales* en *Ustilaginales*) en *Homobasidiomyceteae-Aphyllophraceae*: II. Mededelingen van het botanisch Museum en Herbarium van de Rijksuniversiteit Utrecht 9: 1-278.
Gilbertson RL, Hemmes DE. 2004. New species of lignicolous basidiomycetes from Hawaii. Memoirs of the New York Botanical Garden 89: 81-92.
Jia BS, Cui BK. 2011. Notes on *Ceriporia* (*Basidiomycota*, *Polyporales*) in China. Mycotaxon 116: 457-468. http://dx.doi.org/10.5248/116.457
Læssøe T, Ryvarden L. 2010. Studies in neotropical polypores 26. Some new and rarely recorded polypores from Ecuador. Synopsis Fungorum 27: 34-58.
Li J, Xiong HX, Zho XS, Dai YC. 2007. Polypores (*Basidiomycetes*) from Henan Province in central China. Sydowia 59: 125-137.
Li J, Xiong HX, Dai YC. 2008. Polypores from Shennongjia Nature Reserve in Hubei Province, central China. Cryptogamie Mycologie 29: 267-277.
Lindblad I, Ryvarden L. 1999. Studies in neotropical polypores. 3. New and interesting *Basidiomycetes* (*Poriales*) from Costa Rica. Mycotaxon 71: 335-359.
Mata M, Ryvarden L. 2010. Studies in Neotropical polypores 27. More new and interesting species from Costa Rica. Synopsis Fungorum 27: 59-72.
Núñez M, Ryvarden L. 2001. East Asian polypores 2. *Polyporaceae* s. lato. Synopsis Fungorum 14: 165-522.
Petersen JH. 1996. Farvekort. The Danish Mycological Society's colour-chart. Foreningen til Svampekundskabens Fremme, Greve. 6 p.
Pieri M, Rivoire B. 1997. A propos du genre *Ceriporia* Donk (*Aphyllophoromycetideæ*). Bulletin de la Société Mycologique de France 113: 193-250.
Rajchenberg M. 2000. The genus *Ceriporia* Donk (*Polyporaceae*) in Patagonian Andes Forests of Argentina. Karstenia 40: 143-146.
Ryvarden L, Iturriaga T. 2003. Studies in neotropical polypores 10. New polypores from Venezuela. Mycologia 95: 1066-1077. http://dx.doi.org/10.2307/3761913
Suhara H, Maekawa N, Kaneko S, Hattori T, Sakai K, Kondo R. 2003. A new species, *Ceriporia lacerata*, isolated from white-rotted wood. Mycotaxon 86: 335-347.
Wang B, Dai YC, Cui BK, Du P, Li HJ. 2009. Wood-rotting fungi in eastern China 4. Polypores from Dagang Mountains, Jiangxi Province. Cryptogamie Mycologie 30: 233-241.
Wang B, Cui BK, Li HJ, Du P, Jia BS. 2011. Wood-rotting fungi in eastern China 5. Polypore diversity in Jiangxi Province. Annales Botanici Fennici, 48: 237-246.
Yuan HS, Dai YC. 2008. Polypores from northern and central Yunnan Province, southwestern China. Sydowia 60: 147-159.
Yuan HS, Li J, Huang MY, Dai YC. 2006. *Antrodiella stipitata* sp. nov. from Heilongjiang Province, northeast China, and a critical checklist of polypores from the area. Cryptogamie Mycologie 27: 21-29.